ADDISON WESLEY

Ontario

Math Makes Sense 4

Ontario 2005

Curriculum Companion

ISBN 0-321-41621-X

9 780321 416216

PEARSON Education Canada

Using Your Curriculum Companion

Addison Wesley Mathematics Makes Sense is comprehensive program designed to support teachers in delivering core mathematics instruction in a way that makes mathematical concepts accessible to all students – letting you teach for conceptual understanding, and helping students make sense of the mathematics they learn. ***Addison Wesley Mathematics Makes Sense*** was specifically written to provide 100% curriculum coverage for Ontario teachers and students. The ***Math Makes Sense*** development team wrote, reviewed, and field tested materials according to the requirements of The Ontario Curriculum, Mathematics, released in 1997. Now, with Ontario's initiative or Sustaining Quality Curriculum, the same development team is pleased to provide further support in this **Curriculum Companion**.

Your Curriculum Companion provides you with the specific support you need to maintain 100% curriculum coverage according to the revised 2005 release of The Ontario Curriculum. In this module, you will find:

What's New at Grade 4?
This one-page overview provides your year-at-a-glance, with notes detailing where new curriculum requirements have arisen in the 2005 curriculum.

Unit Planning Charts
For each unit, a one-page overview that recommends required or optional lessons, and indicates whether this module provides additional teaching support to ensure curriculum coverage.

Curriculum Focus Notes
The revised curriculum introduced some new expectations that already form part of the overall conceptual framework on which your Grade 4 program was built. In order to meet these expectations in a more explicit way, **Curriculum Focus Notes** suggest ways that you might use the ***Math Makes Sense 4*** Student Book lesson content to address the expectations. If relevant, the suggestion includes use of an **Extra Practice** master, available in reproducible form following the teaching notes.

Curriculum Focus Lessons
Some expectations in the 2005 revised curriculum for Grade 4 call for additional conceptual development. For these expectations, this module provides a complete plan with detailed teaching notes, reproducible student pages, and a Step-by-Step master, all matching the instructional design of your core Teacher Guide and Student Book. **Curriculum Focus Lessons** are numbered in a logical unit flow: for example, Lesson 10A in Unit 3 is designed to follow Lesson 10 and lead into Lesson 11.

Curriculum Focus Notes and **Curriculum Focus Lessons** follow in sequence, where relevant, after the **Unit Planning Chart**.

Reproducible Masters, with Answers
You'll find reproducible masters provided for any expectation that requires such additional support. Answers for masters are provided with the teaching notes.

Curriculum Correlation
Go to page 55 to find detailed curriculum correlation that demonstrates where each expectation from your grade 4 curriculum is addressed in ***Addison Wesley Math Makes Sense 4***.

What's New at Grade 4?

Unit	Curriculum Focus Notes	Curriculum Focus Lesson Masters
3	Lesson 3: Measuring Angles	
	Lesson 8: Faces of Solids	
		Lesson 10A: Nets
	Lesson 11: Strategies Toolkit	
4	Lesson 4: Exploring Multiplication Patterns	
	Lesson 6: Strategies for Multiplication	
5		Lesson 6A: Double-Bar Graphs
		Lesson 6B: Stem-and-Leaf Plots
6	Lesson 4: Exploring Elapsed Time	
8	Lesson 1: Fractions of a Whole	
	Lesson 7: Comparing and Ordering Fractions	
	Lesson 8: Exploring Tenths	
	Technology: Fractions and Decimals on a Calculator	
9		Lesson 9A: Perimeter and Area of Rectangles
10	Lesson 4: Growing Patterns	
	Lesson 5: Changing-Step Growing Patterns	
	Technology: Creating Patterns on a Computer	

Unit 1 Number Patterns

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Patterns in Charts	Required	
Lesson 2: Exploring Number Patterns	Required	
Lesson 3: Number Patterns with a Calculator	Required	
Lesson 4: Equations Involving Addition	Optional	
Lesson 5: Equations Involving Subtraction	Optional	
Lesson 6: Strategies Toolkit	Optional	
Unit Problem: Calendar Patterns	Required	

Lessons 4 to 6: The material in these lessons is not required by the Grade 4 curriculum. However, these lessons should be taught in the first year of implementation to accommodate students' transition to the new curriculum.

Unit 2 Whole Numbers

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Whole Numbers to 10 000	Required	
Lesson 2: Rounding Numbers	Required	
Lesson 3: Comparing and Ordering Numbers	Required	
Lesson 4: Estimating Sums	Required	
Lesson 5: Using Mental Math to Add	Required	
Lesson 6: Adding 3-Digit Numbers	Required	
Lesson 7: Adding 4-Digit Numbers	Required	
Lesson 8: Estimating Differences	Required	
Lesson 9: Using Mental Math to Subtract	Required	
Lesson 10: Subtracting 3-Digit Numbers	Required	
Lesson 11: Subtracting from a 4-Digit Number	Required	
Lesson 12: Strategies Toolkit	Required	
Unit Problem: Where Shall We Go?	Required	

Unit 3 Geometry

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Congruent Figures	Optional	
Lesson 2: Exploring Angles	Required	
Lesson 3: Measuring Angles	Required: see Focus Note 3.3	paper strips, fasteners
Lesson 4: Exploring Sides in Quadrilaterals	Required	
Lesson 5: Exploring Angles in Quadrilaterals	Required	
Lesson 6: Attributes of Quadrilaterals	Required	
Lesson 7: Similar Figures	Optional	
Technology: Using a Computer to Explore Pentominoes	Optional	
Lesson 8: Faces of Solids	Required: see Focus Note 3.8	Master 3.29 linking cubes, Polydrons
Lesson 9: Solids in Our World	Required	
Lesson 10: Designing Skeletons	Required	
Lesson 10A: Nets **Curriculum expectations:** Draw and describe nets of rectangular and triangular prisms. Construct prisms and pyramids from given nets.	Required	Masters 3.30 to 3.33 Step-by Step 10A: Master 3.34 grid paper, scissors, rulers
Lesson 11: Strategies Toolkit	Required: see Focus note 3.11	
Unit Problem: Under Construction	Required	

Lessons 1 and 7: The material in these lessons is not required by the Grade 4 curriculum. However, these lessons should be taught in the first year of implementation to accommodate students' transition to the new curriculum.

Focus Note 3.3

Curriculum expectation: Identify benchmark angles (i.e., straight angle, right angle, half a right angle), using a reference tool (e.g., paper and fasteners, pattern blocks, straws) and compare other angles to these benchmarks (e.g., "The angle the door makes with the wall is smaller than a right angle but greater than half a right angle.")

Student materials: paper strips, fasteners

Curriculum Focus

The curriculum requires that students identify benchmark angles using a reference tool.

On the board, draw a straight angle:

a right angle:

and half of a right angle:

Have students use 2 paper strips and a fastener to create an angle. In pairs, students choose a benchmark angle, such as the right angle a bulletin board makes with the wall, and compare it to 3 other angles in the classroom. Ensure students use appropriate math vocabulary, such as *greater than a right angle*, or *less than a right angle*. To reinforce this concept, use the angles in Practice question 1 and have students make statements such as "Angle A is greater than half a right angle, but less than a right angle."

Focus Note 3.8

Curriculum expectations: Construct a three-dimensional figure from a picture or model of the figure, using connecting cubes (e.g., use connecting cubes to construct a rectangular prism). Construct three-dimensional figures (e.g., cube, tetrahedron), using only congruent shapes.

Student materials: Master 3.29, linking cubes, Polydrons

Curriculum Focus

The curriculum requires that students construct three-dimensional figures from pictures.

In pairs, have students complete Master 3.29, Constructing Three-Dimensional Figures.

Have students discuss strategies they used to build their models and any difficulties they may have encountered.

Answers to Master 3.29:
Students' models should match the pictures.

Lesson 10A

Nets

Curriculum expectations: Draw and describe nets of rectangular and triangular prisms.
Construct prisms and pyramids from given nets.

LESSON ORGANIZER 40–50 min

Curriculum Focus: Draw nets of solids and construct solids from nets.

Student Materials
- Masters 3.30, 3.31, 3.32, 3.33
- grid paper
- rulers
- scissors

Optional
- Step-by-Step 10A (Master 3.34)

Assessment: Master 3.2 Ongoing Observations: Geometry

Key Math Learnings

1. Solids can be constructed from nets.
2. Different nets can form the same solid.
3. To identify which solid a net represents, match the shapes of the faces with the figures in the net.

Sample Answers

1. a) ii
b) iv
c) i
d) iii

2. a) Rectangular prism
b) No solid formed
c) No solid formed
d) Triangular pyramid

3. a) Students' nets should show 1 square and 4 congruent triangles.
b) Students' nets should show 1 pentagon and 5 congruent triangles.

4. Students' answers may vary.
a) Students' nets should show 3 pairs of congruent rectangles.
b) Students' nets should show 2 congruent triangles and 3 congruent rectangles.

5. There are 11 different nets that will make a cube.

BEFORE — Get Started

Review the properties of prisms and pyramids. Elicit from students how to name a prism or pyramid (prisms and pyramids are named by their bases).

Present *Explore*. Remind students that the diagrams should be folded on the lines. Suggest to students that if folding in one direction doesn't work, to try folding in another direction.

DURING — Explore

Ongoing Assessment: Observe and Listen

Ask questions, such as:
- Which diagram didn't form a solid? (*C*)
- How do you know? (*When I folded Diagram C on the lines in any direction, 2 squares always overlapped.*)
- How could you change the diagram to show a net? (*I could move the first square in the row of 5 below the second square in the row of 5.*)

Each net has 6 congruent square faces. The arrangements are different, but there is always a row of 3 or 4 squares. If I cut out each net and folded it, it would make a cube.

REFLECT: I can find a box and cut it along its edges so that it is one flat piece. Or, I can trace the faces of a rectangular prism and arrange the faces so that when they are folded, they make the prism.

AFTER — Connect

Invite volunteers to share the strategies they used to determine which diagrams were nets and how they identified each solid.

Discuss *Connect*. Invite volunteers to suggest other ways to construct a net for a solid. Then have students construct different nets for the cube and triangular prism than the ones shown. Have students compare and describe the different nets for the same solid.

Practice

Question 5 requires grid paper.

Assessment Focus: Question 5

Encourage students to cut out their arrangements to check that they are nets of a cube. Students should recognize that there is always a row of 3 or 4 squares in a net of a cube. If there are more than 4 squares in a row, squares will overlap.

REACHING ALL LEARNERS

Early Finishers

Materials: 2-Column Chart (PM 17)

In a 2-column chart, students write "Solids" in the left column and "Nets" in the right column. Students sketch different solids in the left column and as many different nets for each solid as they can in the right column. Students compare answers with a classmate.

Common Misconceptions

- Students may struggle to determine whether two nets are the same or different.

How to Help: Encourage students to cut out the nets then try to match them.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students are able to identify a solid from its net. ***Communication*** √ Students can describe the net of a solid. ***Application*** √ Students can construct a solid from a net. √ Students can draw a net for a solid.	***Extra Support:*** Students can use Step-by-Step 10A (Master 3.34) to complete question 5. ***Extra Practice*:** Gather a variety of boxes. Have students cut the boxes along the edges, creating nets. Students sketch the different nets they find. ***Extension:*** Have students explore the different nets that can be made for a tetrahedron.

Recording and Reporting
Master 3.2 Ongoing Observations: Geometry

Focus Note 3.11

Curriculum expectation: Estimate, measure using concrete materials, and record volume, and relate volume to the space taken up by an object (e.g., use centimetre cubes to demonstrate how much space a rectangular prism takes up).

Curriculum Focus

The curriculum requires that students understand volume as a measure of space taken up by an object.

During *Explore*, point out to students that each prism takes up 36 cubic units of space.
During *Connect*, point out to students that each prism takes up 24 cubic units of space.
For each *Practice* question, have students tell how many cubic units of space each prism takes up.

Name: _____ Date:_____

Master 3.29

Constructing Three-Dimensional Figures

1. Use linking cubes to construct the following figures.

a)

b)

c)

d)

e)

f)

2. Use Polydrons to construct the following figures.

a)

b)

c)

d)

Name:_____ Date:_____

Master 3.30

Lesson 10A Nets

Explore

Work with a partner.
You will need grid paper, a ruler, and scissors.
Your teacher will give you a copy of these diagrams.

- Cut out each diagram.

- Which diagrams show nets?
  Identify the solid.
  Record your work.

Show and Share

Compare your answers with those of another pair of students. Share how you and your partner identified each solid.

Connect

A **net** shows all the faces of a solid, joined in one piece. It can be folded to form the solid.
A solid can have different nets.

- One way to find a net for a solid is to cut the solid apart along its edges until it is in one flat piece.

- A net can be created by tracing each face of a solid.
  To make a net from a triangular prism, trace the 2 congruent triangles and 3 congruent rectangles.

Name:_____ Date:_____

Master 3.31

Lesson 10A Continued

Practice

1. Match each solid to its net.

a) **b)**

c) **d)**

i) **ii)**

iii) **iv)**

2. Which diagrams show nets?
Identify the solid.

a) **b)**

c) **d)**

Name:_____ Date:_____

Master 3.32

Lesson 10A Continued

3. Sketch a net for each solid.

a) **b)**

4. Construct two different nets for each solid.

a) **b)**

5. **Assessment Focus**

Draw as many different nets for a cube as you can.
Record your answers on grid paper.
Explain how you know each net forms a cube.

Reflect

Explain how can you construct a net for a rectangular prism.

Master 3.33

Nets of Solids

Name:_____ Date:_____

Master 3.34

Step-by-Step 10A

Lesson 10A, Question 5

You will need 2-cm grid paper.

Step 1 Draw an arrangement of 6 squares on grid paper. Make sure one edge of each square is touching at least one edge of another square.

Cut out your arrangement and fold it.
Is it a net? _____

Step 2 If it is a net, sketch the net on a other piece of paper.

Step 3 Repeat *Steps 1* and *2* using a different arrangement of 6 squares.
Find as many nets as you can.

Step 4 How do you know each net forms a cube?

_____

_____

_____

Unit 4 Multiplication and Division

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Skip Counting	Required	
Lesson 2: Multiplying by Numbers to 9	Required	
Lesson 3: Other Strategies for Multiplying	Required	
Lesson 4: Exploring Multiplication Patterns	Required: see Focus Note 4.4	Master 4.25
Lesson 5: Estimating Products	Required	
Lesson 6: Strategies for Multiplication	Required: see Focus Note 4.6	Master 4.26
Lesson 7: Strategies Toolkit	Required	
Lesson 8: Dividing by Numbers from 1 to 7	Required	
Lesson 9: Dividing by Numbers from 1 to 9	Required	
Lesson 10: Division with Remainders	Required	
Lesson 11: Using Base Ten Blocks to Divide	Required	
Lesson 12: Another Strategy for Division	Required	
Unit Problem: At the Garden Centre	Required	

Focus Note 4.4

Curriculum expectation: Multiply whole numbers by 10, 100, and 1000, and divide whole numbers by 10 and 100, using mental strategies (e.g., use a calculator to look for patterns and generalize to develop a rule).

Student materials: Master 4.25

Curriculum Focus

The curriculum requires that students develop a rule for dividing whole numbers by 10 and 100.

Have students complete Master 4.25, Exploring Division Patterns.

Answers to Master 4.25:

1.

80	60	90
800	600	900
8000	6000	9000

When I divide by 10 or 100, the first digit of the quotient is the same as the number that is being divided by 10 or 100.
When I divide by 10 or 100, I can use the number that is being divided by 10 or 100, and reduce the number of zeros by one or two. For example, in 8000 ÷ 10, I reduce the number of zeros in 8000 by 1 to get the quotient 800. In 8000 ÷ 100, I reduce the number of zeros by 2 to get the quotient 80.

2. **a)** 100 **b)** 400 **c)** 700 **d)** 80 **e)** 90 **f)** 100
3. 800 $10-bills
4. 50 boxes
5. 40 m

Lesson 6: Strategies for Multiplication

Focus Note 4.6

Curriculum expectation: Determine the missing number in equations involving multiplication of one- and two-digit numbers, using a variety of tools and strategies (e.g., modelling with concrete materials, using guess and check with and without the aid of a calculator).

Student materials: Master 4.26

Curriculum Focus

The curriculum requires students to find the missing number in a multiplication sentence.

Have students complete Master 4.26, Find the Missing Number.
Students should begin to see the inverse relationship between multiplication and division.
Invite volunteers to share the strategies they used to find the missing factors.

Answers to Master 4.26:

1. a) 2 **b)** 7 **c)** 5 **d)** 4

2. a) 9 **b)** 4 **c)** 9 **d)** 4 **e)** 4 **f)** 6

3. a) 4 **b)** 12 **c)** 13 **d)** 11 **e)** 13 **f)** 16

Name:_____ Date:_____

Master 4.25

Exploring Division Patterns

1. Use a calculator to find each quotient.

8000 ÷ 100	6000 ÷ 100	9000 ÷ 100
8000 ÷ 10	6000 ÷ 10	9000 ÷ 10
8000 ÷ 1	6000 ÷ 1	9000 ÷ 1

What patterns do you see?
How can you divide by 10 and 100 without using a calculator?

_____

_____

_____

2. Divide.

a) 1000 ÷ 10 **b)** 4000 ÷ 10 **c)** 7000 ÷ 10

d) 8000 ÷ 100 **e)** 9000 ÷ 100 **f)** 10 000 ÷ 100

3. Jade has $8000 in $10 bills.
How many $10 bills does she have?

4. There are 100 cards in one box.
Jeremy has 5000 cards.
How many boxes of cards does Jeremy have?

5. There are 100 cm in 1 m.
Paul's room has length 4000 cm.
What is the length of Paul's room in m?

Name:_____ Date:_____

Master 4.26

Find the Missing Number

1. Use each array to find the missing number.

a)

o o o o
o o o o

__ × 4 = 8

b)

o o o o o o o
o o o o o o o
o o o o o o o

3 × __ = 21

c)

o o o o o
o o o o o
o o o o o
o o o o o
o o o o o

5 × __ = 25

d)

o o o o o o o o
o o o o o o o o
o o o o o o o o
o o o o o o o o

__ × 8 = 32

2. Find the missing number in each multiplication sentence.

a) 3 × __ = 27 **b)** __ × 9 = 36 **c)** __ × 2 = 18

d) 7 × __ = 28 **e)** 6 × __ = 24 **f)** __ × 3 = 18

3. Use a calculator. Find each missing number.

a) 16 × __ = 64 **b)** __ × 6 = 72 **c)** __ × 8 = 104

d) 14 × __ = 154 **e)** __ × 15 = 195 **f)** __ × 12 = 192

Unit 5 Data Management

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Reading Data in Tables	Required	
Lesson 2: Reading Pictographs and Bar Graphs	Required	
Lesson 3: Reading Circle Graphs	Required	
Lesson 4: Drawing Pictographs	Required	
Technology: Making Pictographs Using *Graphers*	Required	
Lesson 5: Drawing Bar Graphs	Required	
Technology: Making Bar Graphs Using *Graphers*	Required	
Lesson 6: Conducting a Survey	Required	
Lesson 6A: Double-Bar Graphs **Curriculum expectations:** Collect and organize discrete primary data and display data in charts, tables, and graphs that have appropriate titles, labels, and scales that suit the range and distribution of the data, using a variety of tools; read, interpret, and draw conclusions from primary data and from secondary data, presented in charts, tables, and graphs; compare similarities and differences between two related sets of data, using a variety of strategies	Required	Masters 5.18 to 5.20 Step-by Step 6A: Master 5.21 1-cm grid paper, number cubes, measuring tapes
Lesson 6B: Stem-and-Leaf Plots **Curriculum expectations:** See expectations for Lesson 6A; describe the shape of a set of data across its range of values, using charts, tables, and graphs.	Required	Masters 5.22 to 5.24 Step-by Step 6B: Master 5.25
Lesson 7: Strategies Toolkit	Required	
Unit Problem: At the Vet	Required	

Lesson 6A

Double-Bar Graphs

Curriculum expectations: Collect and organize discrete primary data and display data in charts, tables, and graphs that have appropriate titles, labels, and scales that suit the range and distribution of the data, using a variety of tools. Read, interpret, and draw conclusions from primary data and from secondary data, presented in charts, tables, and graphs. Compare similarities and differences between two related sets of data, using a variety of strategies

LESSON ORGANIZER 40–50 min

Curriculum Focus: Use double-bar graphs to display, interpret, and compare data.

Student Materials
- Masters 5.18, 5.19, 5.20
- 1-cm grid paper (PM 20)
- number cubes
- measuring tapes

Optional
- Step-by-Step 6A (Master 5.21)

Assessment: Master 5.2 Ongoing Observations: Data Management

Key Math Learnings

1. A double-bar graph displays two sets of related data in one graph.
2. A double-bar graph allows you to make comparisons between two data sets.

BEFORE Get Started

As a class, read the lesson introduction. Ask questions, such as:

- What conclusions can you make from the graph? (*Students did the best in Spelling and the worst in Science. Students did the same in Math and Reading.*)

DURING Explore

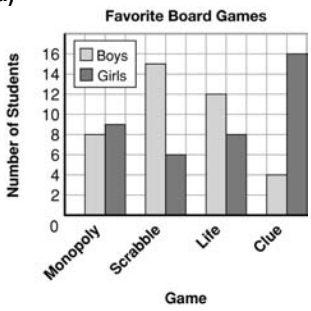
Ongoing Assessment: Observe and Listen

Ask questions, such as:

- What survey question are you using? (*What is your favourite season?*)
- What do you need to include in your bar graph? (*A title, labels for both axes*)
- What scale are you going to use for the vertical axis? (*One square represents 1 student.*)
- How did you decide on your scale? (*The most number of boys chose Summer (9) and the most number of girls chose winter (8) so, there is enough room to use 1 square for each student.*)

Sample Answers

1. a)



b) More girls than boys like Scrabble and Life. More boys than girls like Clue. About the same number of boys and girls like Monopoly.

2. a) Answers will vary
b) Double-bar graphs will vary. Ensure students use an appropriate scale and include labels, a key, and a title.
c) Answers will vary.

3. a) Answers will vary.
b) Bar Graphs will vary. Ensure students use an appropriate scale and include labels and a title.
c) Double-bar graphs will vary. Ensure students use an appropriate scale and include labels, a key, and a title.
d) Answers will vary.

REFLECT: A bar graph and double-bar graph both have bars, scales, and labelled axes. A bar graph uses single bars to represent data. A double bar graph uses pairs of bars to represent two sets of data at the same time.

AFTER Connect

Invite students to share their graphs. Discuss how they labelled the axes and chose the scales.

Use *Connect* to summarize the key steps in making a double-bar graph. Have students use their data from *Explore* to make a double-bar graph. Ask:

- What comparisons can you make from the double-bar graph that you couldn't make from the separate bar graphs? (*You can compare the girls' and boys' favourite seasons*.)

Practice

Students will need 1-cm grid paper, a number cube, and a measuring tape.

Assessment Focus: Question 3

Students draw two bar graphs: one to display elbow-to-wrist lengths, and one to display foot lengths of their group members. Then they draw a double-bar graph to display the same data.

REACHING ALL LEARNERS

Common Misconceptions

➢ Students have difficulty setting up and labelling the horizontal axis on a double-bar graph.

How to Help: Have students examine the double-bar graph in the introduction to the lesson, noting that the paired bars touch, are the same width, and have equal spaces between them.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students understand that a double-bar graph displays two sets of data at the same time. ***Communication*** √ Students make comparisons using a double-bar graph. ***Application*** √ Students draw double-bar graphs to display two sets of data. They use an appropriate scale and include labels, a key, and a title.	***Extra Support*:** Students can use Step-by-Step Master 6A (Master 5.21) to complete question 3. ***Extra Practice*:** Have students design their own survey and repeat *Explore*. Tell students to use a double-bar graph to display the data.

Recording and Reporting
Master 5.2 Ongoing Observations: Data Management

LESSON 6B

Stem-and-Leaf Plots

Curriculum expectations: Collect and organize discrete primary data and display data in charts, tables, and graphs that have appropriate titles, labels, and scales that suit the range and distribution of the data, using a variety of tools.
Read, interpret, and draw conclusions from primary data and from secondary data, presented in charts, tables, and graphs. Demonstrate, through investigation, an understanding of median, and determine the median of a set of data.
Describe the shape of a set of data across its range of values, using charts, tables, and graphs.
Compare similarities and differences between two related sets of data, using a variety of strategies.

LESSON ORGANIZER 40–50 min

Curriculum Focus: Use a stem-and-leaf plot to display and interpret data, and to find the median of the data.

Student Materials
- Masters 5.22, 5.23, 5.24

Optional
- Step-by-Step 6B (Master 5.25)

Assessment: Master 5.2 Ongoing Observations: Data Management

Key Math Learnings

1. Numerical data can be grouped.
2. A stem-and-leaf plot provides a way of organizing and displaying numerical data.
3. The median of a set of ordered data is the middle number.

BEFORE — Get Started

Invite students to describe different ways to display data. Record students' responses on the board. Have students tell where they might see each data display.

Review *mode*.

DURING — Explore

Ongoing Assessment: Observe and Listen

Ask questions, such as:

- Who was the youngest prime minister? (*Clark*)
  The oldest? (*Tupper*)
- How did you display your data? (*In a bar graph*)

Sample Answers

1. a) $0.78/L; $0.94/L
b) $0.91/L; Gasoline was $0.91/L for the most number of days.
c) $0.83/L

2. a)

Stem	Leaf
1	1 4 4 6 7 8
2	1 2 6
3	2

b) 14 km
c) 4; 1

3. a)

Stem	Leaf
9	2 2 8
10	0 3 7
11	3 3 5 5 8 8 9
12	1 6 8 9 9
13	3 4 7
14	1 1 4

b) Most of the bowling scores were in the 110s and 120s.
c) 118.5

4. a) $20
b) $22; There were 4 DVDs that cost $22.

5. a)

Stem	Leaf
2	2 4 4 5 8 8
3	0 5 6 8
4	1 5 5 8
5	0 5
6	0 5

b) The shape is the widest at the 20s leaf and the narrowest at the 50s and 60s leaves.
c) 37 min
d) The median would change to 35 min.

6. Answers will vary. Ensure students aligned the "leaves" correctly and that their statements are appropriate.

REFLECT: A stem-and-leaf plot could be used to display the number of points a basketball team scored in each game of the season.

AFTER Connect

Invite volunteers to share their displays with the class.

Use *Connect* to show students how to construct a stem-and-leaf plot and to introduce *median*. As a class, draw a stem-and-leaf plot using the data from *Explore*. Invite students to compare the stem-and-leaf plot to their displays. Ask students to explain which display they think best represents the data.

Have students find the median age of the first 21 Prime Ministers using the stem-and-leaf plot.

Practice

Assessment Focus: Question 6

Students develop a survey question and survey a minimum of 10 students. They group the data and display the results in a stem-and-leaf plot. Students write statements about the data. Encourage students to include the median and mode number of minutes.

REACHING ALL LEARNERS

Common Misconceptions

- Students have difficulty describing the shape of the leaves because the digits have not been aligned.

How to Help: Have students draw their stem-and-leaf plots on grid paper, putting each leaf in a square.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students understand how to find the median. ***Communication*** √ Students can describe and interpret data in a stem-and-leaf plot. ***Application*** √ Students can organize grouped data in a stem-and-leaf plot. √ Students can find the median of a data set.	***Extra Support*:** Students may benefit from taking turns pointing to one of the leaves on a stem-and-leaf plot and saying the number that is represented. Students can use step-by-Step Master 6B (Master 5.25) to complete question 6. ***Extension:*** Have students create a stem-and-leaf plot for a set of numbers between 100 and 150.

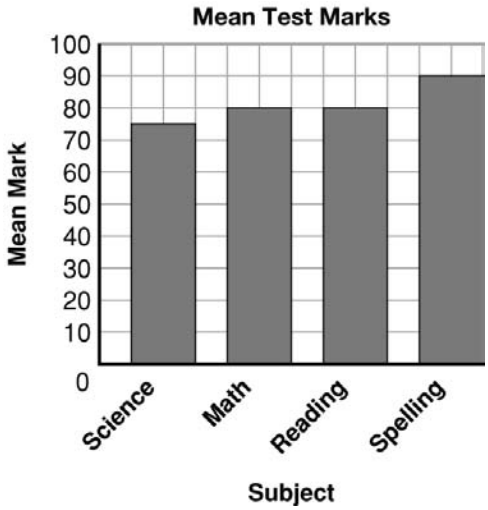
Recording and Reporting
Master 5.2 Ongoing Observations: Data Management

Name:_____ Date:_____

Master 5.18

Lesson 6A Double Bar Graphs

The students in Mr. Rhey's class wrote 4 tests last month. The results are displayed in the graph below.



What conclusions can you make from the graph?

Explore

Suppose you want to find which season the students in your class like best.
Decide on a survey question.
Collect data from an equal number of boys and girls.
Record the data in a table.
Draw a bar graph to display the boys' responses.
Draw a bar graph to display the girls' responses.

Show and Share

Share your graphs with another pair of students.
How are your graphs the same? Different?
What conclusions can you make based on your graphs?

Name:_____ Date:_____

Master 5.19

Lesson 6A Continued

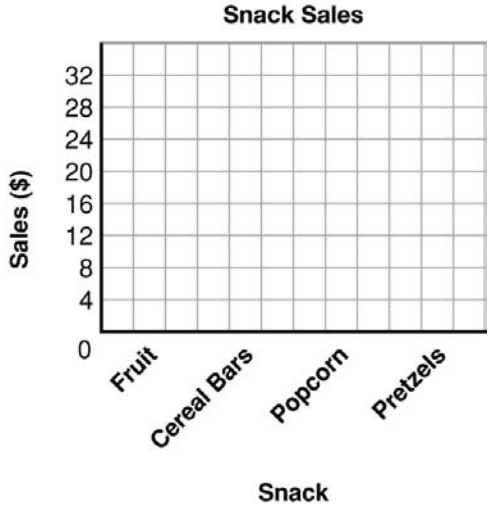
Connect

The Grade 4 class sells snacks at morning and afternoon recesses.
This table shows one day's sales.

Snack Sales		
Snack	**Morning ($)**	**Afternoon ($)**
Fruit	24	20
Cereal Bars	30	12
Popcorn	6	12
Pretzels	6	6

Liam used a **double-bar graph** to display these data.

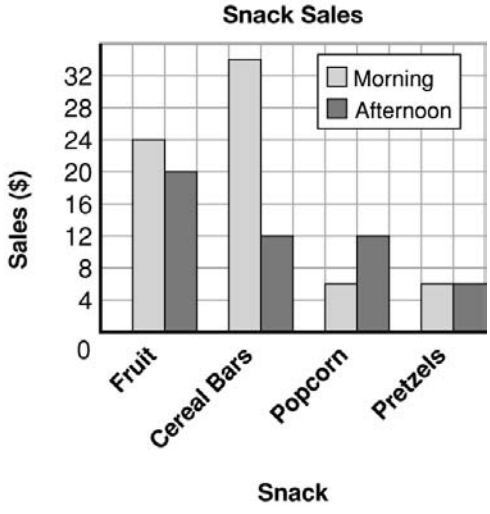
- First, he drew and labelled 2 axes. Then, he chose a scale. One square represents $4.
- He drew two bars for each snack in the table. In each pair, he coloured the Morning bar red and the Afternoon bar green.
- He drew a key to show what each colour of bar represents. Finally, Liam gave the graph a title.



A double-bar graph displays two sets of data at once. You can use the graph to make comparisons between the data sets.

The double bar graph shows that:

- Fruit sales were a little higher in the morning than in the afternoon.
- Cereal bar sales were much higher in the morning than in the afternoon.
- Twice as much popcorn was sold in the afternoon than in the morning.
- Pretzel sales were the same at both recesses.



Name:_____ Date:_____

Master 5.20

Lesson 6A Continued

Practice

1. This table shows some students' favourite board games.

Favourite Board Games		
Game	**Number of Girls**	**Number of Boys**
Monopoly	8	9
Scrabble	15	6
Life	12	8
Clue	4	16

a) Draw a double-bar graph to display the data.
b) Make comparisons between the data sets.

2. Work with a partner.
a) Roll a number cube 25 times each. Record the results of each roll in a table.
b) Draw a double-bar graph to show your data and your partner's data.
c) Make comparisons between the data sets.

3. **Assessment Focus**
Work with 3 classmates to complete part a. Complete parts b, c, and d on your own.
a) Measure the length from each group member's elbow to wrist and foot length to the nearest centimetre.
b) Display the elbow to wrist lengths and the foot lengths in separate bar graphs.
c) Display the elbow to wrist lengths and the foot lengths in a double-bar graph.
d) Describe any conclusions you can make from the double-bar graph that you might not have made from the separate bar graphs.

Reflect

How are a bar graph and a double-bar graph alike? How are they different?

Name:_____ Date:_____

Master 5.21

Step-by-Step 6A

Lesson 6A, Question 3

Use grid paper for *Steps 2, 3, and 4.*

Step 1 Record your name and the names of your group members in the table below. Record the length of each person's elbow to wrist and foot length.

Name	Elbow to Wrist Length (to the nearest cm)	Foot Length (to the nearest cm)

Step 2 Draw a bar graph to display the elbow to wrist lengths.

Step 3 Draw a bar graph to display the foot lengths.

Step 4 Draw a double-bar graph to display the elbow to wrist lengths and foot lengths. Include a key for the graph.

Step 5 What conclusions can you make from the double-bar graph that you might not have made from the separate bar graphs?

_____

_____

_____

Name:_____ Date:_____

Master 5.22

Lesson 6B Stem-and-Leaf Plots

Explore

Work with a partner.

Canada has had 21 Prime Ministers from Confederation in 1867 to 2004. This table shows the ages at which they first became Prime Minister.

Prime Mnisters					
Name	**Age**	**Name**	**Age**	**Name**	**Age**
Macdonald	52	Borden	57	Trudeau	48
Mackenzie	51	Meighen	46	Clark	39
Abbott	70	Mackenzie King	47	Turner	55
Thompson	48	Bennett	60	Mulroney	45
Bowell	70	St.Laurent	66	Campbell	46
Tupper	74	Diefenbaker	61	Chrétien	59
Laurier	54	Pearson	65	Martin	65

Display these data.

Show and Share

Share your display with another pair of students.
How are your displays the same? How are they different?
What do you know from looking at your display?
What is the mode of the ages?

Connect

These are the ages at which the first 15 Prime Ministers died.

76	70	72	49	94
94	78	83	86	75
77	91	83	75	81

You can use a **stem-and-leaf** plot to display the data.

- Order the ages from youngest to oldest.
  49, 70, 72, 75, 75, 76, 77, 78, 81, 83, 83, 86, 91, 94, 94

Name:_____ Date:_____

Master 5.23

Lesson 6B Continued

- Draw a "T."
  Label the columns "Stem" and "Leaf."
- Write each tens digit once in the Stem column.
  Write the ones digits in the Leaf column, in the row next to their corresponding tens digits.

The shape of the leaves shows that most of the ages are in the 70s and 80s.

Three of the Prime Ministers were over 90 when they died.

- You can use a stem-and-leaf plot to find the **median** of a data set.

There are 15 ages, so the median age is 8th. Count to 8 leaves on the stem-and-leaf-plot.

The middle number is 78.

There are 7 ages greater than 78 and 7 ages less than 78.

The median age is 78.

The **median** of an ordered set of data is the value in the middle. If there are two middle values, it is the middle of the two values.

The data in a stem-and-leaf plot are already ordered.

Practice

1. This stem-and-leaf plot shows the price, in cents, of 1 L of gasoline over 13 days.

a) What is the cheapest price of gasoline? The most expensive?

b) What is the mode price? How do you know?

c) What is the median price?

Name:_____ Date:_____

Master 5.24

Lesson 6B Continued

2. Here are the distances, in kilometres, that Tina drove each day over 10 days.
11, 32, 14, 26, 18, 17, 16, 14, 22, 21
a) Display the data in a stem-and-leaf plot.
b) What is the mode distance?
c) How many days did Tina drive more than 20 km? 30 km?

3. Here are bowling scores of a Grade 4 class.
a) Display the data in a stem-and-leaf plot.
b) What does the shape of the leaves show?
c) What is the median score?

141	98	107	92	133	129
142	141	100	92	113	115
134	128	103	126	113	121
118	115	118	129	137	119

4. Here is a list of prices of DVDs in dollars.
22, 16, 18, 20, 22, 24, 30, 15, 19, 17, 20, 22, 24, 22, 17
a) What is the median price?
b) What is the mode price?

5. This table shows the number of minutes customers stayed at a restaurant.
a) Use a stem-and-leaf plot to display the data.
b) Describe the shape of the stem-and-leaf plot.
c) What is the median number of minutes?
d) Suppose customers who stayed longer than 50 min were not included in the data. How would this affect the median?

30	24	41	28	36	24
22	25	35	55	45	65
45	38	48	60	50	28

6. **Assessment Focus** Survey at least 10 classmates about the number of minutes it takes them to get to school.
Display your data in a stem-and-leaf plot.
Write statements about the data.

Reflect

Write about a situation in which you might use a stem-and-leaf plot to display data.

Name:_____ Date:_____

Master 5.25

Step-by-Step 6B

Lesson 6B, Question 6

You will survey 10 or more classmates about the number of minutes it takes to get to school

Step 1 Write your survey question.

_____

Step 2 Survey your classmates.
Record the times in the box below.

Step 3 Order the times from least to greatest.

_____

Step 4 Draw a stem-and-leaf plot.
Use the tens digits as the stems.
Use the ones digits as the leaves.

Step 5 Write statements about the data.

_____

_____

_____

Unit 6 Measurement

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Exploring Units of Time	Required	
Lesson 2: Telling Time	Required	
Lesson 3: Estimating Time	Required	
Lesson 4: Exploring Elapsed Time	Required: see Focus Note 6.4	
Lesson 5: Estimating and Counting Money	Required	
Lesson 6: Making Change	Required	
Lesson 7: Strategies Toolkit	Required	
Lesson 8: Measuring Capacity	Required	
Lesson 9: Measuring Mass	Required	
Unit Problem: The Cooking Show	Required	

Lesson 4: Exploring Elapsed Time

Focus Note 6.4

Curriculum expectation: Estimate and determine elapsed time, with and without using a time line, given the durations of events expressed in five-minute intervals, hours, days, weeks, months, or years.

Curriculum Focus

The curriculum requires that students determine elapsed time with and without using a time line.

Extend *Explore* by having students draw a time line for their day at Funland Park. Have students trade time lines with a classmate and calculate the elapsed time between each activity on their classmate's timeline.

Unit 7 Transformational Geometry

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Grids and Coordinates	Required	
Lesson 2: Translations	Optional	
Lesson 3: Reflections	Required	
Lesson 4: Lines of Symmetry	Required	
Lesson 5: Rotations	Optional	
Technology: Transformations on a Computer	Optional but recommended	
Lesson 6: Patterns with Transformations	Required	
Lesson 7: Strategies Toolkit	Optional	
Unit Problem: At the Fun House!	Optional but recommended	

Technology: Some of the material in the Technology feature is not required by the Grade 4 curriculum. To cover only the required material, have students omit Steps 7 to 9.

Unit Problem: Some of the material in the Unit Problem is not required by the Grade 4 curriculum. To cover only the required material, have students use only reflections in Parts 1, 2, and 3.

Unit 8 Fractions and Decimals

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Fractions of a Whole	Required: see Focus Note 8.1	Pattern Blocks
Lesson 2: Fraction Benchmarks	Required:	
Lesson 3: Fractions of a Set	Required	
Lesson 4: Strategies Toolkit	Required	
Lesson 5: Different Names for Fractions	Required	
Lesson 6: More than One	Optional but recommended	
Lesson 7: Comparing and Ordering Fractions	Required: see Focus Note 8.7	Master 8.28 Fraction Circles
Lesson 8: Exploring Tenths	Required: see Focus Note 8.8	Base Ten Blocks
Technology: Calculator Counting	Required	
Lesson 9: Exploring Hundredths	Optional	
Technology: Fractions and Decimals on a Calculator	Required: see Focus Note Technology	
Lesson 10: Comparing and Ordering Decimals	Optional	
Lesson 11: Adding Decimals	Required	
Lesson 12: Subtracting Decimals	Required	
Lesson 13: Adding and Subtracting Money	Required	
Unit Problem: Spring Activities Day	Optional	

Lesson 6: Although some of this material is not directly required by the Grade 4 curriculum, the lesson is recommended as a prerequisite for Lessons 7 and 8.

Lesson 1: Fractions of a Whole

Focus Note 8.1

Curriculum expectation: Count forward by halves, thirds, fourths, and tenths to beyond one whole, using concrete materials and number lines.

Student Materials: Pattern Blocks

Curriculum Focus

The curriculum requires that students count by fractions of a whole beyond one whole.

Extend *Connect* to include counting by fractions of a whole. Display 3 yellow Pattern Blocks. Model how to count by halves by placing red Pattern Blocks on top of the yellow Pattern Blocks while saying: “one half, two halves, three halves, four halves, five halves," and so on. Repeat using the blue Pattern blocks to count by thirds, and then the green Pattern Blocks to count by sixths.

To reinforce this concept, have students work in pairs and count by thirds using red and green Pattern Blocks. Observe students as they count. Students should be able to count beyond three thirds.

Lesson 7: Comparing and Ordering Fractions

Focus Note 8.7

Curriculum expectation: Compare and order fractions by considering the size and the number of fractional parts.

Student Materials: Master 8.28, Fraction Circles

Curriculum Focus

The curriculum requires that students compare and order fractions with denominators 2, 3, 4, 5, and 10.

Model how to compare and order fractions using Fraction Circles or number lines. For example, compare $\frac{2}{5}$ and $\frac{2}{4}$. Students should recognize that $\frac{2}{4}$ is greater than $\frac{2}{5}$ because the size of the part in $\frac{2}{4}$ is larger. Then, write 3 fractions on the board and use Fraction Circles to help order them from least to greatest. Repeat with different fractions until students grasp the concepts.

Have students complete Master 8.28, More Practice Comparing and Ordering Fractions.

Answers to Master 8.28: 1. a) > b) < c) = d) < e) = f) > 2. $\frac{1}{10}, \frac{2}{10}, \frac{4}{10}, \frac{1}{2}, \frac{3}{5}, \frac{8}{10}$

3. $\frac{4}{5}, \frac{2}{3}, \frac{3}{5}, \frac{2}{4}, \frac{1}{3}, \frac{1}{5}$ **4.** The bag that is $\frac{2}{5}$ full.

5. Chris ran the farthest in 1 min. The order from greatest to least is Chris, Kelsey, Noor, Keesha, then Jason.

Lesson 8: Exploring Tenths

Focus Note 8.8

Curriculum expectation: Count forward by tenths from any decimal number expressed to one decimal place, using concrete materials and number lines (e.g., use base ten materials to represent 3.7 and count forward: 3.8 3.9, 4.0, 4.1, …; "Three and seven tenths, three and eight tenths, three and nine tenths, four, four and one tenth, …").

Student materials: Base Ten Blocks

Curriculum Focus

The curriculum requires that students count by tenths from any decimal number with 1 decimal place.

Extend *Connect* to include counting by tenths by modelling how to count on from 2.1. Continue to add rods while counting: "two and two tenths, two and three tenths, two and three tenths, …"

In pairs, have students write each fraction from *Explore* as a decimal and count forward. Observe and listen to students as they are counting on.

Technology: Fractions and Decimals on a Calculator

Focus Note Technology

Curriculum expectation: Determine and explain, through investigation, the relationship between fractions (i.e., halves, fifths, tenths) and decimals to tenths, using a variety of tools (e.g., concrete materials, drawings, calculators) and strategies (e.g., decompose $\frac{2}{5}$ into $\frac{4}{10}$ by dividing each fifth into two equal parts to show that $\frac{2}{5}$ can be represented as 0.4).

Curriculum Focus

The curriculum requires that students can relate fractions with denominators 2, 5, and 10 to decimals.

Have students repeat the *Explore* to find the decimal equivalent of these fractions: $\frac{1}{2}, \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}$ (*Answers: 0.5, 0.2, 0.4, 0.6, 0.8*)

Replace *Practice* questions c to e with the following fractions:

c) $\frac{6}{10}$ **d)** $\frac{1}{2}$ **e)** $\frac{5}{5}$ (*Answers: 0.6, 0.5, 1*)

Name:_____ Date:_____

Master 8.28

More Practice Comparing and Ordering Fractions

Use Fraction Circles or number lines if they help.

1. Compare each pair of fractions. Write <, >, or =.

a) $\frac{3}{5} \square \frac{2}{5}$ **b)** $\frac{1}{4} \square \frac{1}{3}$ **c)** $\frac{1}{2} \square \frac{5}{10}$

d) $\frac{2}{3} \square \frac{4}{5}$ **e)** $\frac{4}{5} \square \frac{8}{10}$ **f)** $\frac{9}{10} \square \frac{2}{4}$

2. Write these fractions in order from least to greatest.

$\frac{1}{10}, \frac{3}{5}, \frac{8}{10}, \frac{4}{10}, \frac{1}{2}, \frac{2}{10}$

3. Write these fractions in order from greatest to least.

$\frac{1}{3}, \frac{1}{5}, \frac{3}{5}, \frac{2}{4}, \frac{4}{5}, \frac{2}{3}$

4. A bag is $\frac{1}{3}$ full of apples. Another bag the same size is $\frac{2}{5}$ full of apples.

Which bag has the most apples? Explain.

5. Five students ran a race on a track to see who could run the farthest in 1 min.

Kelsey ran $\frac{4}{5}$ the distance of the track, Jason ran $\frac{1}{3}$ the distance of the track, Noor ran $\frac{3}{4}$ the distance of the track, Keesha ran $\frac{1}{2}$ the distance of the track, and Chris ran $\frac{9}{10}$ the distance of the track.

Order the distances from greatest to least.

Who ran the farthest distance in 1 min?

Unit 9 Length, Perimeter, and Area

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Measuring Linear Dimensions	Required	
Lesson 2: Measuring in Millimetres	Required	
Lesson 3: Measuring in Decimetres	Required	
Lesson 4: Strategies Toolkit	Required	
Lesson 5: Relating Units of Measure	Required	
Lesson 6: Measuring Perimeter	Required	
Lesson 7: Finding the Perimeter of a Large Region	Required	
Lesson 8: Exploring Area	Required	
Lesson 9: Measuring Area in Square Centimetres	Required	
Lesson 9A: Perimeter and Area of Rectangles **Curriculum Expectation:** Determine, through investigation, the relationship between the side lengths of a rectangle and its perimeter and area.	Required	Masters 9.26 to 9.28 Step-by Step 9A: Master 9.29 1-cm grid paper (PM 20), 11 by 11 geoboards, geobands, grid chart paper
Lesson 10: Estimating and Measuring Area	Required	
Lesson 11: Finding Area in Square Metres	Required	
Lesson 12: Exploring Figures with Equal Perimeters	Required	
Lesson 13: Exploring Figures with Equal Areas	Required	
Unit Problem: Design a Backyard	Required	

LESSON 9A

Perimeter and Area of Rectangles

Curriculum expectation: Determine, through investigation, the relationship between the side lengths of a rectangle and its perimeter and area.

LESSON ORGANIZER 40–50 min

Curriculum Focus: Investigate the relationship between the side lengths of a rectangle and its perimeter and area.

Teacher Materials

- 1-cm grid transparency (PM 20)
- grid chart paper

Student Materials

- Masters 9.26, 9.27, 9.28
- geoboards
- geobands
- 1-cm grid paper (PM 20)

Optional

- Step-by-Step 9A (Master 9.29)

Assessment: Master 9.2 Ongoing Observations: Length, Perimeter, and Area

Key Math Learnings

1. The perimeter of a rectangle is 2 times the sum of its length and width.
2. The area of a rectangle is the product of its length and width.

BEFORE — Get Started

Review how to find the area and perimeter of a figure. Draw a L-figure on grid chart paper. Invite volunteers to tell how they would find the area and perimeter of the figure.

DURING — Explore

Ongoing Assessment: Observe and Listen

Ask questions, such as:

- How did you find the perimeter of the rectangle? (*I drew the rectangle on 1-cm grid paper. Then I counted along the outside of the rectangle. Each side of every square on the grid paper is 1 cm long. So, the rectangle has perimeter 24 cm.)*
- How did you find the area? (I c*ounted the number of squares inside the rectangle to find the area in square centimetres.*)

Sample Answers

1. a) A: P = 20 units; A = 24 square units
B: P = 20 units; A = 16 square units
C: P = 18 units; A = 20 square units
b) C, B and A; B, C, A

2. a) Students' answers will vary. Make sure students include the appropriate units of measurement (square units for area).

3. a) Two times the sum of the rectangle's length and width is 16 cm.
b) 7 units by 1 unit rectangle: 7 cm²; 6 units by 2 units rectangle: 12 cm²; 5 units by 3 units rectangle: 15 cm²; 4 units by 4 units rectangle: 16 cm²
c) See answers to part b.
d) No, the areas will be different. The area of the first rectangle is 7 cm². The product of the length and width of the new rectangle is 15 cm².

4. a) 1 cm by 36 cm: 74 cm; 2 cm by 18 cm: 40 cm; 3 cm by 12 cm: 30 cm; 4 cm by 9 cm: 26 cm; 6 cm by 6 cm: 24 cm

REFLECT: The perimeter of a rectangle is 2 times the sum of its length and width. The area of a rectangle is the product of its length and width.

Invite a student to tell how they found the perimeter (*24 units*) and area (*35 square units*) of the original figure in *Explore*. Invite volunteers to draw the rectangle they made on a transparency on the overhead projector. Record the length, width, perimeter, and area of each rectangle in a chart. Have students discuss the relationship between the side lengths of each rectangle and its perimeter and area.

Present *Connect*.

Practice

1-cm grid paper is needed for questions 2 to 4.

Assessment Focus: Question 3

Students draw rectangles with perimeter 16 units. Possible rectangles include 7 units by 1 unit, 6 units by 2 units, 5 units by 3 units, and 4 units by 4 units. Students should discover that rectangles with the same perimeter can have different areas.

REACHING ALL LEARNERS

Early Finishers

Have students repeat *Explore* using a rectangle with different dimensions.

Common Misconceptions

- Students add the length and width to find perimeter.

How to Help: Remind students that perimeter is the distance around a figure, including all side lengths. Reinforce the fact that a rectangle has 2 pairs of equal sides.

ASSESSMENT FOR LEARNING

What to Look For	What to Do
Knowledge and Understanding √ Students understand the relationship between the side lengths of a rectangle and its perimeter. √ Students understand the relationship between the side lengths of a rectangle and its area. ***Application*** √ Students can find the perimeter and area of a rectangle.	***Extra Support*:** Students can use Step-by-Step Master 9A (Master 9.29) to complete question 3. ***Extension:*** Students measure objects that are rectangles and calculate the perimeter and area of each rectangle.

Recording and Reporting
Master 9.2 Ongoing Observations: Length, Perimeter, and Area

Name:_____ Date:_____

Master 9.26

Lesson 9A Perimeter and Area of Rectangles

Explore

Work with a partner.

You will need an 11 by 11 geoboard, geobands, and 1-cm grid paper.

- Make this rectangle on the geoboard.

Draw the rectangle on 1-cm grid paper.
Find its perimeter and its area.

On the geoboard, make a different rectangle.
Draw the rectangle on 1-cm grid paper.
Find its perimeter and the area.

Record your answers in a table.

Length (units)	Width (units)	Perimeter (units)	Area (square units)

Show and Share

Talk with another pair of students about how you used the geoboard to find the perimeter and the area.
Look for a relationship between the side lengths of the rectangle and its perimeter.
Look for a relationship between the side lengths of the rectangle and its area.

Name:_____ Date:_____

Master 9.27

Lesson 9A Continued

Connect

There is a relationship between the side lengths of a rectangle and its perimeter and area.

Length (cm)	Width (cm)	Perimeter (cm)	Area (square cm)
5	3	16	15

- The perimeter is 2 times the sum of its length and width.

  The length of the rectangle is 5 cm.
  The width of the rectangle is 3 cm.
  5 + 3 = 8
  8 × 2 = 16
  The perimeter of the rectangle is 16 cm.

- The area is the product of its length and width.

  5 × 3 = 15
  The area of the rectangle is 15 cm^2.

Name:_____ Date:_____

Master 9.28

Lesson 9A Continued

Practice

1. **a)** Find the perimeter and area of each rectangle.

b) Order the figures from least to greatest perimeter.
c) Order the figures from least to greatest area.

2. Use 1-cm grid paper.
Draw 3 rectangles.
Find and record the perimeter and area of each rectangle.

3. **Assessment Focus**
Use 1-cm grid paper.
Draw a rectangle with perimeter 16 cm.
a) Explain how you know the perimeter is 16 cm.
b) What is the area of your rectangle?
c) Draw a different rectangle with perimeter 16 cm.
d) Is the area of the new rectangle the same as the first rectangle? Explain how you know.

4. A rectangle has area 36 cm².
What are possible perimeters of the rectangle?

Reflect

Explain the relationships between the side lengths of a rectangle and its perimeter and area. Use pictures and words.

Name:_____ Date:_____

Master 9.29

Step-by-Step 9A

Lesson 9A, Question 3

You will need an 11 by 11 geoboard, a geoband, and 1-cm grid paper.

Step 1 What is the perimeter of the rectangle? _____

Step 2 Use the geoboard and geoband to make a rectangle.
Find the perimeter of the rectangle.
Move the geoband until the rectangle has perimeter 16 cm.

Step 3 Draw the rectangle on 1-cm grid paper.

Step 4 Explain how you know the perimeter of the rectangle from *Step 3* is 16 cm.

_____

_____

Step 5 What is the length of the rectangle from *Step 3*? _____
The width? _____

What is the area of the rectangle? _____

Step 6 Repeat *Step 2* to find a different rectangle with perimeter 16 units.

Draw your rectangle on 1-cm grid paper.

Is the area of the new rectangle the same as the area of the first rectangle? Explain.

_____

_____

Unit 10 Patterns in Number and Geometry

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: Repeating Patterns	Required	
Lesson 2: Patterns in Multiplication	Required	
Lesson 3: Multiplying a 3-Digit Number by a 1-Digit Number	Optional	
Lesson 4: Growing Patterns	Required: see Focus Note 10.4	Master 10.21
Lesson 5: Changing-Step Growing Patterns	Required: see Focus Note 10.5	
Lesson 6: Strategies Toolkit	Required	
Lesson 7: Patterns in Division with Remainders	Required	
Lesson 8: Dividing a 3-Digit Number by a 1-Digit Number	Optional	
Lesson 9: Area Patterns	Required	
Technology: Creating Patterns on a Computer	Required: see Focus Note Technology	
Unit Problem: Fun and Games	Required	

Focus Note 10.4

Curriculum expectation: Demonstrate an understanding of simple multiplicative relationships involving unit rates, through investigation using concrete materials and drawings (e.g., scale drawings in which 1 cm represents 2 m).

Student materials: Master 10.21

Curriculum Focus

The curriculum requires that students understand unit rates.

Introduce the term *rate* (a rate compares two items measured in different units). Give some examples of rates and record them on the board, such as $0.93/L, 60 km/h, and 4 necklaces/h. Model how to read and write a rate. Introduce students to the "per" symbol (/), meaning "for every" or "in every." Explain that a *unit rate* is a rate that has 1 unit as its second measurement (all the given examples are unit rates). Invite volunteers to give other examples of unit rates and record their examples.

Investigate the multiplicative relationship involving unit rates using one of the examples. Pose this question: If a person makes 4 necklaces/h, how many necklaces can she make in 2 h? Draw a picture of 4 necklaces grouped together. Tell students the group of 4 necklaces represents 1 h. Add another group of 4 necklaces.
$4 \times 2 = 8$
So, the person can make 8 necklaces in 2 h.
Add another group of 4 necklaces. Have students determine how many necklaces she can make in 3 h, then 4 h. Students should be able to come up with $4 \times 3 = 12$ and $4 \times 4 = 16$.

Have students complete Master 10.21, Unit Rates.

Answers to Master 10.21:

1. a) 8 pages/h **b)** 32 km/h **c)** 30 steps/ladder **d)** 10 crayons/box **e)** 5 words/min

d) 6 commercials/show

2. $3 \times 3 = 9$; Saheel can walk 3 km in 3 h.

3. $2 \times 5 = 10$; Kyle paid $10.

4. $7 \times 6 = 42$; Rachel made $42.

5. $8 \times 8 = 64$; The actual distance is about 64 km.

Lesson 5: Changing-Step Growing Patterns

Focus Note 10.5

Curriculum expectation: Connect each term in a growing or shrinking pattern with its term number (e.g., in the sequence 1, 4, 7, 10, …, the first term is 1, the second term is 4, and the third term is 7, and so on) and record the patterns in a table of values that shows the term number and the term.

Curriculum Focus

The curriculum requires that students understand the vocabulary *term* and *term number*.

Extend *Explore* by pointing out to students that the number of squares in each frame forms a pattern. Each number is called a *term*. The *term number* shows its position in the pattern.

Ask questions, such as:

- In Pattern A, what number is term 2? (*2*) Term 4? (*4*)
- In Pattern B, what number is term 3? (4) Term 4? (7)

To reinforce this vocabulary, have students name each term and its term number using the patterns in *Connect*. Invite students to create 2-column tables for the patterns in *Connect* using the column headings *Term Number* and *Term*.

Technology: Patterns on a Computer

Focus Note Technology

Curriculum expectation: Extend and create repeating patterns that result from reflections, through investigation using a variety of tools (e.g., pattern blocks, dynamic geometry software, dot paper).

Curriculum Focus

The curriculum requires that students use geometry software to create patterns.

Have students complete the activity by creating a pattern that uses only reflections. Have students describe the reflections they used.

Invite volunteers to share their patterns with the class.

Display students' patterns.

Name: _____ Date: _____

Master 10.21

Unit Rates

1. Write each amount as a unit rate.

a) 8 pages per hour

b) 32 kilometres per hour

c) 30 steps per ladder

d) 10 crayons per box

e) 5 words per minute

f) 6 commercials per show

For questions 2 to 5, use a multiplication sentence to show your answers.

2. Saheel can walk 3 km/h.
How far can he walk in 3 h?

3. The cost of hockey cards is $2/package.
Kyle bought 5 packages.
How much did he pay?

4. Rachel makes $7/h babysitting.
On Saturday she worked 6 h.
How much money did she make?

5. This map uses a scale of 1 cm represents 8 km.
What is the actual distance between Toronto and Hamilton?

Unit 11 Probability

Lesson	Curriculum Coverage	Lesson Masters and Materials
Lesson 1: The Language of Probability	Optional but recommended	
Lesson 2: Identifying Outcomes and Predicting Results	Optional but recommended	
Lesson 3: Strategies Toolkit	Optional	
Lesson 4: Exploring Predictions	Required	
Lesson 5: Predicted and Actual Results	Required	
Unit Problem: At the Carnival	Required	

Lessons 1 and 2: Although this material is not directly required by the Grade 4 curriculum, it is recommended as a review of probability concepts, and can be used to connect to new material in lessons 4 and 5. These lessons should be taught in the fist year of implementation to accommodate students' transition to the new curriculum.

Correlation of Ontario Mathematics 2005 Curriculum to Addison Wesley Math Makes Sense 4

Mathematical Process Expectations

The mathematical process expectations are to be integrated into student learning associated with all the strands.

Throughout Grade 4, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, Correlation:**
Problem Solving develop, select, and apply problem-solving strategies as they pose and solve problems and conduct investigations, to help deepen their mathematical understanding;	*Throughout the program*. ***Math Makes Sense*** follows a problem-solving approach in every lesson, with **Explore** activities that lead students to conceptual understanding at a developmentally appropriate level; **Show & Share** discussions allow students to deepen their mathematical understanding of that central problem through sharing perspectives on the same problem or investigation. **Practice** questions include a range of problem types, regularly including a non-routine problem in the **Assessment Focus** question. Further explicit support in developing problem-solving strategies is featured in **Connect** sections, where mathematical thinking is modeled, and in **Strategies Toolkit** lessons. Students apply their problem-solving strategies throughout each lesson, and in **Unit Problems** and **Cross-Strand Investigations**.

Throughout Grade 4, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, Correlation:**
Reasoning and Proving develop and apply reasoning skills (e.g., classification, recognition of relationships, use of counter-examples) to make and investigate conjectures and construct and defend arguments;	*Throughout the program*. Because ***Math Makes Sense*** is grounded in a problem-solving approach to developing mathematical ideas, the program consistently calls on students to apply their reasoning skills in the central **Explore** activities, during follow-up **Show & Share** discussions, and in completing a range of **Practice** questions. Discussion prompts and Practice questions regularly ask students to explain their reasoning. **Connect** summaries help to model the reasoning behind mathematical concepts, as they offer consolidation of concepts. **Unit Problems** and **Cross-Strand Investigations** also draw on students' reasoning skills as they work through a more comprehensive problem.

Throughout Grade 4, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, Correlation:**
Reflecting demonstrate that they are reflecting on and monitoring their thinking to help clarify their understanding as they complete an investigation or solve a problem (e.g., by comparing and adjusting strategies used, by explaining why they think their results are reasonable, by recording their thinking in a math journal);	*Throughout the program*. ***Math Makes Sense*** offers regular opportunities to encourage students to reflect on their strategies and monitor their progress with a problem or investigation, through such features as **Show & Share** discussions in each **Explore**, selected **Practice** questions including **Assessment Focus** questions that direct students to explain their thinking, and **Reflect** prompts at the close of each lesson. **Connect** sections in each lesson model the process of reflection during problem solving.

Through Grade 4, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, Correlation:**
Selecting Tools and Computational Strategies select and use a variety of concrete, visual, and electronic learning tools and appropriate computational strategies to investigate mathematical ideas and to solve problems;	*Throughout the program*. **Explore** activities either explicitly identify materials to use, to provide students with experience using a range of materials, or they allow students to select the most appropriate tool. Similarly, **Practice** questions may leave the choice of tool to students as they prepare to solve a problem. Students have opportunities to select appropriate computational strategies in the regularly occurring feature entitled **Numbers Every Day. Technology** features and **Technology** lessons develop ongoing expertise in use of electronic learning tools.

Through Grade 4, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, Correlation:**
Connecting make connections among mathematical concepts and procedures, and relate mathematical ideas to situations or phenomena drawn from other contexts (e.g., other curriculum areas, daily life, sports);	*Throughout the program*. In addition to the ongoing developmental flow, in which applications-based problems surface regularly in **Explore**, **Connect**, and **Practice** questions, the Student Book highlights connections in **Unit Problems**, **Cross-Strand Investigations**, **Math Links**, and feature pages on **The World of Work**.

Through Grade 4, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, Correlation:**
Representing create a variety of representations of mathematical ideas (e.g., by using physical models, pictures, numbers, variables, diagrams, graphs, onscreen dynamic representations), make connections among them, and apply them to solve problems;	*Throughout the program*. **Explore** activities help develop students' facility with multiple representations through the range of materials and representations to which students are exposed across the course of the program; **Show & Share** discussions encourage students to think about multiple representations of the same concept, while **Connect** summaries model such representations.

Through Grade 4, students will:

Mathematical Process Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, Correlation:**
Communicating communicate mathematical thinking orally, visually, and in writing, using everyday language, a basic mathematical vocabulary, and a variety of representations, and observing basic mathematical conventions.	*Throughout the program*. In addition to the ongoing developmental flow, supporting Student Book features include: **Show & Share** discussions in each **Explore** activitiy; **Connect** summaries to model consolidation of concepts and mathematical conventions; **Assessment Focus** questions; **Reflect** prompts at the close of each lesson; **Strategies Toolkit** lessons; **Unit Problems**; **Cross-Strand Investigations; Key Words** at the start of each unit, and an illustrated **Glossary**.

Number Sense and Numeration

Overall Expectations

By the end of Grade 4, students will:

- read, represent, compare, and order whole numbers to 10 000, decimal numbers to tenths, and simple fractions, and represent money amounts to $100;
- demonstrate an understanding of magnitude by counting forward and backwards by 0.1 and by fractional amounts;
- solve problems involving the addition, subtraction, multiplication, and division of single- and multi-digit whole numbers, and involving the addition and subtraction of decimal numbers to tenths and money amounts, using a variety of strategies;
- demonstrate an understanding of proportional reasoning by investigating whole-number unit rates.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
Quantity Relationships represent, compare, and order whole numbers to 10 000, using a variety of tools (e.g., drawings of base ten materials, number lines with increments of 100 or other appropriate amounts);	2.1, 2.3
demonstrate an understanding of place value in whole numbers and decimal numbers from 0.1 to 10 000, using a variety of tools and strategies (e.g., use base ten materials to represent 9307 as 9000 + 300 + 0 + 7);	2.1, 2.3, 8.8
read and print in words whole numbers to one thousand, using meaningful contexts (e.g., books, highway distance signs);	2.1
round four-digit whole numbers to the nearest ten, hundred, and thousand, in problems arising from real-life situations;	2.2

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
represent, compare, and order decimal numbers to tenths, using a variety of tools (e.g., concrete materials such as paper strips divided into tenths and base ten materials, number lines, drawings) and using standard decimal notation;	8.8
represent fractions using concrete materials, words, and standard fractional notation, and explain the meaning of the denominator as the number of the fractional parts of a whole or a set, and the numerator as the number of fractional parts being considered;	8.1, 8.3
compare and order fractions (i.e., halves, thirds, fourths, fifths, tenths) by considering the size and the number of fractional parts (e.g., $\frac{4}{5}$ is greater than $\frac{3}{5}$ because there are more parts in $\frac{4}{5}$; $\frac{1}{4}$ is greater than $\frac{1}{5}$ because the size of the part is larger in $\frac{1}{4}$);	8.7 with supporting TG note and BLM
compare fractions to the benchmarks of 0, $\frac{1}{2}$, and 1 (e.g., $\frac{1}{8}$ is closer to 0 than to $\frac{1}{2}$; $\frac{3}{5}$ is more than $\frac{1}{2}$;	8.2
demonstrate and explain the relationship between equivalent fractions, using concrete materials (e.g., fraction circles, fraction strips, pattern blocks)and drawings (e.g., "I can say that $\frac{3}{6}$ of my cubes are white, or half of the cubes are white. This means that $\frac{3}{6}$ and $\frac{1}{2}$ are equal.");	8.5
read and represent money amounts to $100 (e.g., five dollars, two quarters, one nickel, and four cents is $5.59);	6.5, 6.6
solve problems that arise from real-life situations and that relate to the magnitude of whole numbers up to 10 000;	2.1, throughout Unit 2

Specific Expectations	*Addison Wesley Mathematics Makes Sense Grade 4*, lessons:
Counting count forward by halves, thirds, fourths, and tenths to beyond one whole, using concrete materials and number lines (e.g., use fraction circles to count fourths: "one fourth, two fourths, three fourths, four fourths, five fourths, six fourths, …");;	8.1 with supporting TG note
count forward by tenths from any decimal number expressed to one decimal place, using concrete materials and number lines (e.g., use base ten materials to represent 3.7 and count forward: 3.8 3.9, 4.0, 4.1, …; "Three and seven tenths, three and eight tenths, three and nine tenths, four, four and one tenth, …");	8.8 with supporting TG note, Technology feature, page 294
Operational Sense add and subtract two-digit numbers using a variety of mental strategies (e.g., one way to calculate 73 – 39 is to subtract 40 from 73 to get 33, and then add 1 back to get 34);	Numbers Every Day feature, 2.5, 2.9
solve problems involving the addition and subtraction of four-digit numbers, using student-generated algorithms and standard algorithms (e.g., "I added 4217 + 1914 using 5000 + 1100 + 20 + 11.");	2.6, 2.7, 2.8, 2.9, 2.10, 2.11
add and subtract decimal numbers to tenths, using concrete materials (e.g., paper strips divided into tenths, base ten materials) and student-generated algorithms (e.g., "When I added 6.5 and 5.6, I took five tenths in fraction circles and added six tenths in fraction circles to give me one whole and one tenth. Then I added 6 + 5 + 1.1, which equals 12.l.");	8.11, 8.12
add and subtract money amounts by making simulated purchases and providing change for amounts up to $100, using a variety of tools (e.g., currency manipulatives, drawings);	8.13
multiply to 9 x 9 and divide to 81 ÷ 9, using a variety of mental strategies (e.g., doubles, doubles plus another set, skip counting);	4.1, 4.2, 4.3, 4.8, 4.9, 4.10
solve problems involving the multiplication of one-digit numbers, using a variety of mental strategies (e.g., 6 x 8 can be thought of as 5 x 8 + 1 x 8);	4.3

Specific Expectations	*Addison Wesley Mathematics Makes Sense Grade 4*, lessons:
multiply whole numbers to 10, 100, and 1000, and divide whole numbers by 10 and 100, using mental strategies (e.g., use a calculator to look for patterns and generalize to develop a rule);	4.4 with supporting TG note and BLM
multiply two-digit whole numbers by one-digit whole numbers, using a variety of tools (e.g., base ten materials or drawings of them, arrays), student-generated algorithms, and standard algorithms;	4.6, 10.2
divide two-digit whole numbers by one-digit whole numbers, using a variety of tools (e.g., concrete materials, drawings) and student-generated algorithms;	4.11, 4.12, 10.7
use estimation when solving problems involving the addition, subtraction, and multiplication of whole numbers, to help judge the reasonableness of a solution;	2.4, 2.8, 4.5
Proportional Relationships describe relationships that involve simple whole-number multiplication (e.g., "If you have 2 marbles and I have 6 marbles, I can say that I have three times the number of marbles you have.");	4.2, 4.3
determine and explain, through investigation, the relationship between fractions (i.e., halves, fifths, tenths) and decimals to tenths, using a variety of tools (e.g., concrete materials, drawings, calculators) and strategies (e.g., decompose $\frac{2}{5}$ into $\frac{4}{10}$ by dividing each fifth into two equal parts to show that $\frac{2}{5}$ can be represented as 0.4);	8.8, Technology feature, page 297, with
demonstrate an understanding of simple multiplicative relationships involving unit rates, through investigation using concrete materials and drawings (e.g., scale drawings in which 1 cm represents 2 m).	10.4 with supporting TG note and BLM

Measurement

Overall Expectations

By the end of Grade 4, students will:

- estimate, measure, and record length, perimeter, area, mass, capacity, volume, and elapsed time, using a variety of strategies;
- determine the relationships among units and measurable attributes, including the area and perimeter of rectangles.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
Attributes, Units, and Measurement Sense estimate, measure and record length, height, and distance, using standard units (i.e., millimetre, centimetre, metre, kilometres) (e.g., a pencil that is 75 mm long);	9.1, 9.2
draw items using a ruler, given specific lengths in millimetres and centimetres;	9.1, 9.2
estimate, measure (i.e., using an analogue clock), and represent time intervals to the nearest minute;	6.1, 6.2
estimate and determine elapsed time, with and without using a time line, given the durations of events expressed in five-minute intervals, hours, days, weeks, months, or years;	6.3, 6.4 with supporting TG note
estimate, measure using a variety of tools (e.g., centimetre grid paper, geoboard) and strategies, and record the perimeter and area of polygons;	9.6, 9.7, 9.8, 9.9, 9.10, 9.11
estimate, measure, and record the mass of objects (e.g., apple, baseball, book), using the standard units of the kilogram and the gram;	6.9
estimate, measure, and record the capacity of containers (e.g., a drinking glass, a juice box), using the standard units of the litre and the millilitre;	6.8
estimate, measure using concrete materials, and record volume, and relate volume to the space taken up by an object (e.g., use centimetre cubes to demonstrate how much space a rectangular prism takes up);	3.11 with supporting TG note

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
Measurement Relationships describe, through investigation, the relationship between various units of length (i.e., millimetre, centimetre, decimetre, metre, kilometre);	9.1, 9.2, 9.3, 9.5
select and justify the most appropriate standard unit (i.e., millimetre, centimetre, decimetre, metre, kilometre) to measure the side lengths and perimeters of various polygons;	9.6, 9.7
determine, through investigation, the relationship between the side lengths of a rectangle and its perimeter and area;	9.9A (TG lesson)
pose and solve meaningful problems that require the ability to distinguish perimeter and area (e.g., "I need to know about area when I cover a bulletin board with construction paper. I need to know about perimeter when I make the border.");	9.11
compare and order a collection of objects, using standard units of mass (i.e., gram, kilogram) and/or capacity (i.e., millilitre, litre);	6.8, 6.9
determine, through investigation, the relationship between grams and kilograms;	6.9
determine, through investigation, the relationship between millilitres and litres;	6.8
select and justify the most appropriate standard unit to measure mass (i.e., milligram, gram, kilogram) and the most appropriate standard unit to measure the capacity of a container (i.e., millilitre, litre);	6.8, 6.9
solve problems involving the relationship between years and decades, and between decades and centuries;	6.1
compare, using a variety of tools (e.g., geoboard, pattern blocks, dot paper), two-dimensional shapes that have the same perimeter or the same area.	9.12, 9.13

Geometry and Spatial Sense

Overall Expectations

By the end of Grade 4, students will:

- identify quadrilaterals and three-dimensional figures and classify them by their geometric properties, and compare various angles to benchmarks;
- construct three-dimensional figures, using two-dimensional shapes;
- identify and describe the location of an object, using a grid map, and reflect two-dimensional shapes.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
Geometric Properties draw the lines of symmetry of two-dimensional shapes, through investigation, using a variety of tools (e.g., Mira, grid paper) and strategies (e.g., paper folding);	7.4
identify and compare different types of quadrilaterals (i.e., rectangle, square, trapezoid, parallelogram, rhombus) and sort and classify them by their geometric properties (e.g., sides of equal length; parallel sides; symmetry; number of right angles);	3.4, 3.5, 3.6
identify benchmark angles (i.e., straight angle, right angle, half a right angle), using a reference tool (e.g., paper and fasteners, pattern blocks, straws) and compare other angles to these benchmarks (e.g., "The angle the door makes with the wall is smaller than a right angle but greater than half a right angle.");	3.2, 3.3 with supporting TG note
relate the names of benchmark angles to their measure in degrees (e.g., a right angle is 90º);	3.3
identify and describe prisms and pyramids, and classify them by their geometric properties (i.e., shapes of faces, number of edges, number of vertices),using concrete materials;	3.8, 3.9
Geometric Relationships construct a three-dimensional figure from a picture or model of the figure, using connecting cubes (e.g., use connecting cubes to construct a rectangular prism);	3.8 with supporting TG note and BLM

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
construct skeletons of three-dimensional figures, using a variety of tools (e.g., straws and modelling clay, toothpicks and marshmallows, Polydrons), and sketch the skeletons;	3.10
draw and describe nets of rectangular and triangular prisms;	3.10A (TG lesson)
construct prisms and pyramids from given nets;	3.10A (TG lesson)
construct three-dimensional figures (e.g., cube, tetrahedron), using only congruent shapes;	3.8 with supporting TG note and BLM
Location and Movement identify and describe the general location of an object using a grid system (e.g., "The library is located at A3 on the map.");	7.1
identify, perform, and describe reflections using a variety of tools (e.g., Mira, dot paper, technology);	7.3
create and analyse symmetrical designs by reflecting a shape, or shapes, using a variety of tools (e.g., pattern blocks, Mira, geoboard, drawings), and identify the congruent shapes in the designs.	7.6, 10.9

Patterning and Algebra

Overall Expectations

By the end of Grade 4, students will:

- describe, extend, and create a variety of numeric and geometric patterns, make predictions related to the patterns, and investigate repeating patterns involving reflections
- demonstrate an understanding of equality between pairs of expressions, using addition, subtraction, and multiplication.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
Patterns and Relationships extend, describe, and create repeating, growing, and shrinking number patterns (e.g., "I created the pattern 1, 3, 4, 6, 7, 9 … I started at 1, then added 2, then added 1, then added 2, then added 1, and I kept repeating this.");	1.1, 1.2, 1.3
connect each term in a growing or shrinking pattern with its term number (e.g., in the sequence 1, 4, 7, 10, …, the first term is 1, the second term is 4, and the third term is 7, and so on) and record the patterns in a table of values that shows the term number and the term;	1.1, 10.4, 10.5 with supporting TG note
create a number pattern involving addition, subtraction, or multiplication, given a pattern rule expressed in words (e.g., the pattern rule "start at 1 and multiply each term by 2 to get the next term" generates the sequence 1, 2, 4, 8, 16, 32, 64, …);	1.2, 10.4, 10.5
make predictions related to repeating geometric or numeric patterns;	10.1, 10.4, 10.5
extend and create repeating patterns that result from reflections, through investigation using a variety of tools (e.g., pattern blocks, dynamic geometry software, dot paper);	7.6, Technology feature, page 390
Expressions and Equality determine, through investigation, the inverse relationship between multiplication and division (e.g., since 4 x 5 = 20, then 20 ÷ 5 = 4; since 35 ÷ 5 = 7, then 7 x 5 = 35);	4.8, 4.9

Specific Expectations	*Addison Wesley Mathematics Makes Sense Grade 4*, lessons:
determine the missing number in equations involving multiplication of one- and two-digit numbers, using a variety of tools and strategies (e.g., modeling with concrete materials, using guess and check with and without the aid of a calculator);	4.6 with supporting TG note and BLM
identify, through investigation (e.g., by using sets of objects in arrays, by drawing area models) and use the commutative property of multiplication to facilitate computation with whole numbers (e.g., "I know that 15 x 7 x 2 equals 15 x 2 x 7. This is easier to multiply in my head because I get 30 x 7 = 210.");	4.2
identify, through investigation (e.g., by using sets of objects in arrays, by drawing area models), and use the distributive property of multiplication over addition to facilitate computation with whole numbers (e.g., "I know that 9 × 52 equals 9 × 50 + 9 × 2. This is easier to calculate in my head because I get 450 + 8 = 468.").	4.6, 10.2

Data Management and Probability

Overall Expectations

By the end of Grade 4, students will:

- collect and organize discrete primary date and display the data using charts and graphs, including stem-and-leaf plots and double bar graphs;
- read, describe, and interpret primary data and secondary data presented in charts and graphs, including stem-and-leaf plots and double bar graphs;
- predict the results of a simple probability experiment, then conduct the experiment and compare the prediction to the results.

Students will:

Specific Expectations	***Addison Wesley Mathematics Makes Sense Grade 4*, lessons:**
Collection and Organization of Data collect data by conducting a survey (e.g., "Choose your favourite meal from the following list: breakfast, lunch, dinner, other.") or an experiment to do with themselves, their environment, issues in their school or community, or content from another subject, and record observations or measurements;	5.4, 5.6, Unit 5 Problem
collect and organize discrete primary data and display data in charts, tables, and graphs (including stem-and-leaf plots and double bar graphs) that have appropriate titles, labels (e.g., appropriate units marked on the axes) and scales (e.g., with appropriate increments) that suit the range and distribution of the data, using a variety of tools (e.g., graph paper, simple spreadsheets, dynamic statistical software);	5.4, 5.5, Technology feature, page 187, 5.6A (TG lesson), 5.6B (TG lesson)
Data Relationships read, interpret, and draw conclusions from primary data (e.g., survey results, measurements, observations) and from secondary data (e.g., temperature data in the newspaper, data from the Internet about endangered species), presented in charts, tables, and graphs (including stem-and-leaf plots and double bar graphs);	5.1, 5.2, 5.3, 5.6A (TG lesson), 5.6B (TG lesson)
demonstrate, through investigation, an understanding of median (e.g., "The median is the value in the middle of the data. If there are two middle values, you have to calculate the middle of those two values."), and determine the median of a set of data (e.g., "I used a stem-and-leaf plot to help me find the median.");	5.6B (TG lesson)

Specific Expectations	*Addison Wesley Mathematics Makes Sense Grade 4*, lessons:
describe the shape of a set of data across its range of values, using charts, tables, and graphs (e.g., "The data values are spread out evenly."; "The set of data bunches up around the median.");	5.6B (TG lesson)
compare similarities and differences between two related sets of data, using a variety of strategies (e.g., by representing the data using tally charts, stem-and-leaf plots, or double bar graphs; by determining the mode or the median; by describing the shape of a data set across its range of values);	5.6A (TG lesson), 5.6B (TG lesson)
Probability predict the frequency of an outcome in a simple probability experiment, explaining their reasoning, conduct the experiment; and compare the result with the prediction;	11.4, 11.5
determine, through investigation, how the number of repetitions of a probability experiment can affect the conclusions drawn.	11.5

Addison Wesley
Mathematics
Makes Sense

Program Authors

Peggy Morrow
Ralph Connelly
Bryn Keyes
Jason Johnston
Steve Thomas
Jeananne Thomas
Angela D'Alessandro
Maggie Martin Connell
Don Jones
Michael Davis
Linden Gray
Sharon Jeroski
Trevor Brown
Linda Edwards
Susan Gordon

Printed and bound in Canada

2 3 4 5 – DPC – 10 09

PEARSON
Education
Canada